

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

1 1. (original) A process for producing an acetyl anhydride comprising contacting
2 methane and carbon dioxide in an anhydrous environment in the presence of effective amounts
3 of a transition metal catalyst and a reaction promoter, and an acid anhydride compound, and
4 optionally an acid, to produce a product comprising the acetyl anhydride.

1 2. (original) A process according to claim 1 further comprising:

2 (b) contacting the product comprising the acetyl anhydride with water.

1 3. (original) A process according to claim 2 further comprising recovering
2 acetic acid from step (b).

1 4. (original) A process according to claim 1 further comprising:

2 (b) contacting the product comprising the acetyl anhydride with an alcohol.

1 5. (original) A process according to claim 4 further comprising recovering an
2 acetate ester from the product of step (b).

1 6. (original) A process according to claim 4 further comprising
2 recovering acetic acid from the product of step (b).

1 7. (original) A process according to claim 1 in which the catalyst is a
2 vanadium-containing catalyst.

1 8. (original) A process according to claim 7 in which the catalyst is selected
2 from vanadium pentoxide, vanadium trioxide, sodium metavanadate, vanadium-containing
3 heteropolyacid catalysts and vanadyl acetylacetonate.

1 9. (original) A process according to claim 7 in which the catalyst is vanadyl
2 acetylacetonate.

1 10. (original) A process according to claim 1 in which the reaction promoter is
2 selected from $K_2S_2O_8$, $K_4P_2O_8$, calcium dioxide, urea-hydrogen peroxide, and m-
3 chloroperbenzoic acid.

1 11. (original) A process according to claim 10 in which the reaction promoter is
2 $K_2S_2O_8$.

1 12. (original) A process according to claim 1 in which the acid anhydride
2 compound comprises sulfur trioxide, sulfur dioxide, trifluoroacetic acid anhydride,
3 fluoromethanesulfonic acid anhydride, trifluoromethanesulfonic acid anhydride, fluorosulfonic
4 acid anhydride, methanesulfonic acid anhydride, NO, NO₂, N₂O₅, P₂O₅, SeO₃, As₂O₅, TeO₃, or
5 B₂O₃ or a mixture of two or more of the foregoing.

6 13. (currently amended) A process according to claim 1 in which the acid
7 anhydride compound [...] comprises trifluoroacetic acid anhydride.

1 14. (original) A process according to claim 1 in which the acid anhydride
2 compound comprises trifluoromethanesulfonic acid anhydride.

1 15. (original) A process according to claim 1 in which the acid anhydride
2 compound comprises sulfur trioxide.

3 16. (original) A process according to claim 1 in which the acid anhydride
4 compound comprises fuming sulfuric acid.

1 17. (original) A process according to claim 1 in which an acid is present during
2 the contacting.

1 18. (original) A process according to claim 17 in which the acid comprises
2 trifluoroacetic, methanesulfonic, fluorosulfonic, fluoromethanesulfonic,
3 trifluoromethanesulfonic, sulfuric, fuming sulfuric, sulfurous, nitric, nitrous, phosphoric,

4 phosphorous, superphosphoric, or boric acid, or a selenium- and tellurium-containing analog of
5 the sulfur-containing acids, or a mixture of two or more of the foregoing.

1 19. (original) A process according to claim 17 in which the acid comprises
2 fuming sulfuric acid.

1 20. (original) A process according to claim 17 in which the acid comprises
2 trifluoroacetic acid.

1 21. (original) A process according to claim 17 in which the acid comprises
2 trifluoromethanesulfonic acid.

1 22. (original) A process according to claim 1 in which the acetyl anhydride
2 comprises acetyl sulfate.

1 23. (original) A process according to claim 1 in which the acetyl anhydride
2 comprises acetyl trifluoroacetate.

1 24. (original) A process according to claim 1 in which the acetyl anhydride
2 comprises acetyl trifluoromethanesulfonate.

1 25. (original) A process according to claim 1 in which the temperature is from
2 about 10 to about 200 °C.

1 26. (original) A process according to claim 1 in which the temperature is from
2 about 60 to about 100 °C.

1 27. (original) A process for producing acetic acid comprising:

2 (a) contacting methane and carbon dioxide in an anhydrous environment in the
3 presence of effective amounts of a transition metal catalyst and a reaction promoter, and an acid
4 anhydride compound, and optionally an acid, to produce a product comprising an acetyl
5 anhydride; and

6 (b) contacting the product of step (a) with water.

- 1 28. (original) A process according to claim 27, further comprising:
2 (c) recovering acetic acid from the product of step (b).
- 1 29. (original) A process according to claim 27 in which the catalyst is a
2 vanadium-containing catalyst.
- 1 30. (original) A process according to claim 29 in which the catalyst is selected
2 from vanadium pentoxide, vanadium trioxide, sodium metavanadate, vanadium-containing
3 heteropolyacid catalysts and vanadyl acetylacetonate.
- 1 31. (original) A process according to claim 29 in which the catalyst is vanadyl
2 acetylacetonate.
- 1 32. (original) A process according to claim 29 in which the reaction promoter is
2 selected from $K_2S_2O_8$, $K_4P_2O_8$, calcium dioxide, urea-hydrogen peroxide and m-
3 chloroperbenzoic acid.
- 1 33. (original) A process according to claim 32 in which the reaction promoter is
2 $K_2S_2O_8$.
- 1 34. (original) A process according to claim 27 in which the acid anhydride
2 compound comprises sulfur trioxide, sulfur dioxide, trifluoroacetic acid anhydride,
3 trifluoromethanesulfonic acid anhydride, fluoromethanesulfonic acid anhydride, fluorosulfonic
4 acid anhydride, methanesulfonic acid anhydride, NO, NO₂, N₂O₅, P₂O₅, SeO₃, As₂O₅, TeO₃, or
5 B₂O₃, or a mixture of two or more of the foregoing.
- 1 35. (original) A process according to claim 27 in which the acid anhydride
2 compound comprises trifluoroacetic acid anhydride.
- 1 36. (original) A process according to claim 27 in which the acid anhydride
2 compound comprises trifluoromethanesulfonic acid anhydride.
- 1 37. (original) A process according to claim 27 in which the acid anhydride
2 compound comprises sulfur trioxide.

3 38. (original) A process according to claim 27 in which the acid anhydride
4 compound comprises fuming sulfuric acid.

1 39. (original) A process according to claim 27 in which an acid is present during
2 the contacting.

1 40. (original) A process according to claim 39 in which the acid comprises
2 trifluoroacetic, fluorosulfonic, methanesulfonic, fluoromethanesulfonic,
3 trifluoromethanesulfonic, sulfuric, fuming sulfuric, sulfurous, nitric, nitrous, phosphoric,
4 phosphorous, superphosphoric or boric acid, or a selenium- or tellurium-containing analog of the
5 sulfur-containing acids, or a mixture of two or more of the foregoing.

1 41. (original) A process according to claim 39 in which the acid comprises
2 fuming sulfuric acid.

1 42. (original) A process according to claim 39 in which the acid comprises
2 trifluoroacetic acid.

1 43. (original) A process according to claim 39 in which the acid comprises
2 trifluoromethanesulfonic acid.

1 44. (original) A process according to claim 27 in which the acetyl anhydride
2 comprises acetyl sulfate.

1 45. (original) A process according to claim 27 in which the acetyl anhydride
2 comprises acetyl trifluoroacetate.

1 46. (original) A process according to claim 27 in which the acetyl anhydride
2 comprises acetyl trifluoromethanesulfonate.

1 47. (original) A process according to claim 27 in which step (a) is conducted at
2 a temperature of from about 10 to about 200 °C.

1 48. (original) A process according to claim 27 in which the step (a) is conducted
2 at a temperature of from about 60 to about 100 °C.

1 49. (original) A process according to claim 27 further comprising recovering
2 acetic acid from step (b).

1 50. (original) A process according to claim 39 in which an acid corresponding to
2 the acid used in step (a) is recovered from step (b), and said acid is recycled to step (a).

1 51. (original) A process for the production of an acetate ester comprising:

2 (a) contacting methane and carbon dioxide in an anhydrous environment in the
3 presence of effective amounts of a transition metal catalyst and a reaction promoter, and an acid
4 anhydride compound, and optionally an acid, to produce a product comprising an acetyl
5 anhydride; and

6 (b) reacting the product of step (a) with an alcohol to produce a product comprising an
7 acetate ester.

1 52. (original) A process according to claim 51, further comprising

2 (c) recovering the acetate ester from the product of step (b).

54. (original) A process according to claim 51 in which the product of step (b) further comprises acetic acid, said process further comprising:

(c) recovering acetic acid from the product of step (b).

54. (canceled)